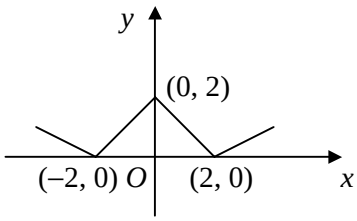
1 **a** $= (x-4)^2 - 16 + 18$
$= (x-4)^2 + 2$

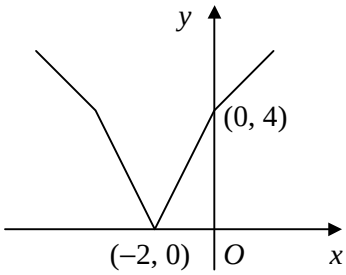
b vertex = (4, 2)
$\therefore$ dist. $= \sqrt{4^2 + 2^2}$
$= \sqrt{20} = 2\sqrt{5}$

c translation by 4 units in +ve x-direction
translation by 2 units in +ve y-direction
(either first)

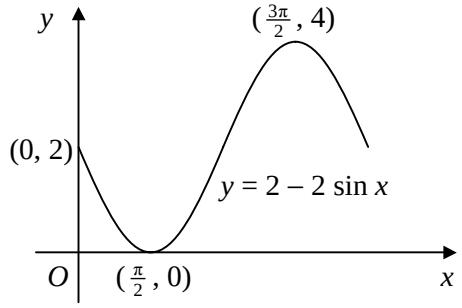
2 **a**



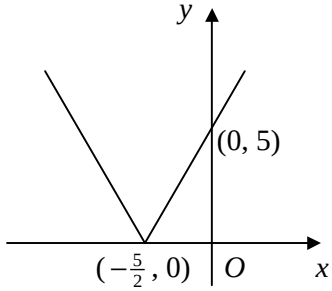
b



3



4 **a**



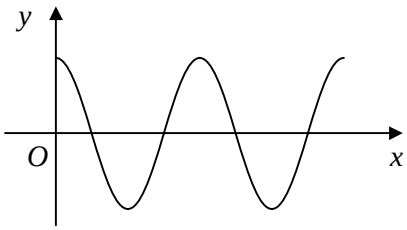
b f(–4) = $|-3| = 3$
ff(–4) = f(3) = $|11| = 11$

c $-\frac{5}{2}$

5 **a** (0, 2) $\therefore$ $a = 2$
(90, 7) $\therefore$ $7 = 2 + b$ $\therefore$ $b = 5$

b $2 + 5 \sin x = 0$
$\sin x = -0.4$
$x = 180 + 23.6, 360 - 23.6$
$x = 203.6°, 336.4°$ (1dp)

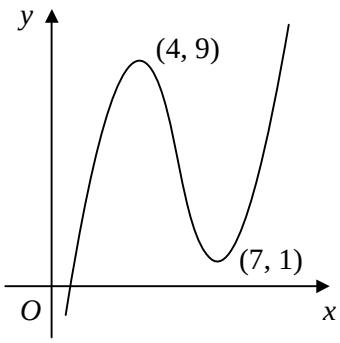
6 **a**



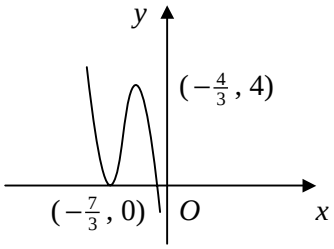
b (45, 0), (135, 0), (225, 0), (315, 0)

c (0, 3), (90, –3), (180, 3), (270, –3), (360, 3)

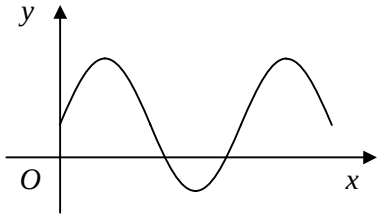
7 **a**



b



8 **a**



b (30°, 1.5), (90°, –0.5), (150°, 1.5)

c $\frac{1}{2} + \sin 3x = 0$

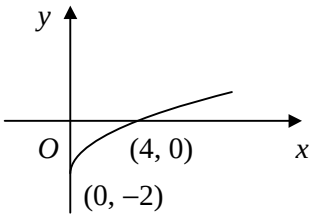
$\sin 3x = -\frac{1}{2}$

$3x = 180 + 30, 360 - 30$

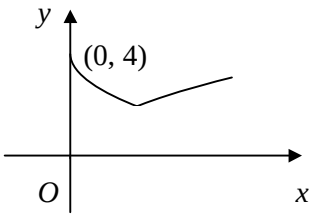
$= 210, 330$

$x = 70°, 110°$

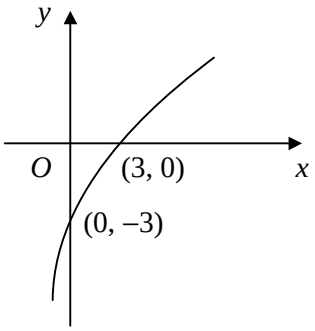
9 **a**



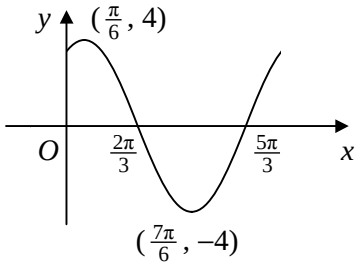
b



c



10



11 **a** $y = \frac{3x-5}{x-2}$

swap $x = \frac{3y-5}{y-2}$

$xy - 2x = 3y - 5$

$y(x - 3) = 2x - 5$

$y = \frac{2x-5}{x-3}$

$f^{-1}(x) = \frac{2x-5}{x-3}$, $x \in \mathbb{R}$, $x \neq 3$

b $f(x) = 4 \Rightarrow x = f^{-1}(4) = 3$

c $f(x) = \frac{3(x-2)+1}{x-2} = 3 + \frac{1}{x-2}$

$\therefore\ a = 3, b = 1$

d translation by 2 in the positive x-direction and translation by 3 in the positive y-direction (either first)